

WHAT IS CLAIMED IS:

1. A continuous process of providing a highly smooth surface to a metallic tape, the process comprising:
passing a metallic tape having an initial roughness through an acid bath contained within a polishing section of an electropolishing unit over a pre-selected period of time;
5 and,
passing a mean surface current density of at least 0.18 amperes per square centimeter through the metallic tape during the period of time the metallic tape is in the acid bath whereby the roughness of the metallic tape is reduced.
2. The process of claim 1 wherein said initial roughness is a RMS roughness of more than about 10 nm and said reduced roughness of the metallic tape is a RMS roughness of less than about 4 nm.
3. The process of claim 2 wherein the mean surface current density is at least 0.37 amperes per square centimeter and the RMS roughness of the metallic tape is reduced to less than 0.5 nm.
4. The process of claim 1 wherein the RMS roughness of the metallic tape is reduced to less than 0.5 nm.
5. The process of claim 1 wherein the acid bath includes a mixture of sulphuric acid and phosphoric acid.
6. The process of claim 2 wherein the acid bath includes a mixture of sulphuric acid and phosphoric acid.
7. The process of claim 1 wherein the metallic tape is a polycrystalline metal.
8. The process of claim 7 wherein the polycrystalline metal includes nickel.
9. The process of claim 1 wherein the metallic tape is in direct electrical contact with an anode in said electropolishing unit while said metallic tape is within an electrically conductive liquid throughout said electropolishing unit and within said acid bath in said polishing section, said acid bath further in contact with a cathode in said
5 electropolishing unit so as to complete an electrical circuit.
10. The process of claim 9 wherein the anode includes a metal selected from the group consisting of titanium, niobium, tantalum, platinum, rhenium, rhodium, nickel, chromium, gold and silver.

11. The process of claim 10 wherein the acid bath includes a mixture of sulphuric acid and phosphoric acid.

12. The process of claim 1 wherein the metallic tape is in direct electrical contact with an anode in said electropolishing unit while said metallic tape is in contact with mechanical contacts as the metallic tape is passed through the acid bath so as to complete an electrical circuit.

13. The process of claim 1 wherein the metallic tape is passed through the acid bath and the acid bath provides electrical contact with the metallic tape.

14. A template article comprising:

a metallic substrate characterized by a highly smooth RMS roughness level of less than about 4 nm, the highly smooth RMS roughness level provided through the process of claim 1;

5 one or more intermediate layers upon the surface of the metallic substrate; and,
a layer of an oriented cubic oxide material having a rock-salt-like structure upon the one or more intermediate layers.

15. The template article of claim 14 wherein said metallic substrate characterized by a highly smooth RMS roughness level of less than about 1 nm.

16. The template article of claim 14 wherein said one or more layers includes a layer of an inert oxide material upon the surface of the metallic substrate; and,
5 a layer of an oxide or oxynitride material upon the inert oxide material layer.

17. The template article of claim 15 wherein said one or more layers includes a layer of an inert oxide material upon the surface of the metallic substrate; and,
a layer of an oxide or oxynitride material upon the inert oxide material layer.

18. The template article of claim 14 wherein said cubic oxide material is
10 magnesium oxide.

19. The template article of claim 14 wherein said magnesium oxide is deposited by ion-beam-assisted deposition.